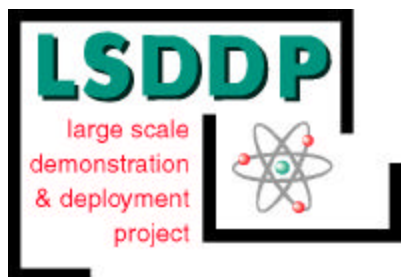


321-M - Fuel Fabrication Facility Large Scale Demonstration & Deployment Project



X-Ray, K-Edge

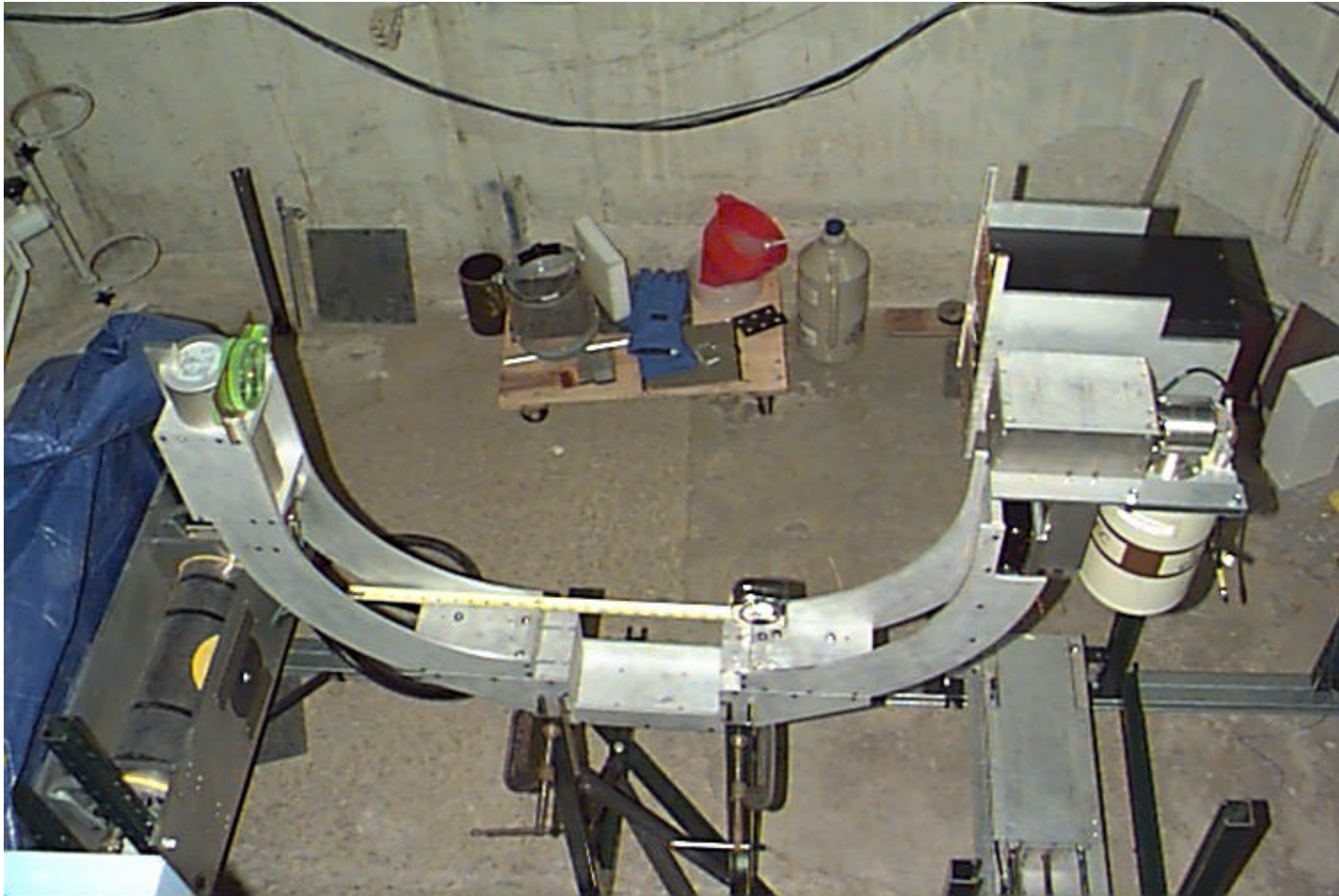
X-RAY, K-EDGE HEAVY METAL DETECTION SYSTEM



X-Ray, K-Edge

Overview of Technology Demonstration

- Technology Provider - Ames Laboratory and the Center for Non-Destructive Evaluation at Iowa State University
- Equipment & Operation
- Technology Demonstration Scope - Rooftop Portion of the Lathe Enclosures Exhaust System
- Methodology for Acquiring Data



Inspection Head - Side View



X-Ray, K-Edge

**Inspection Head
End View**





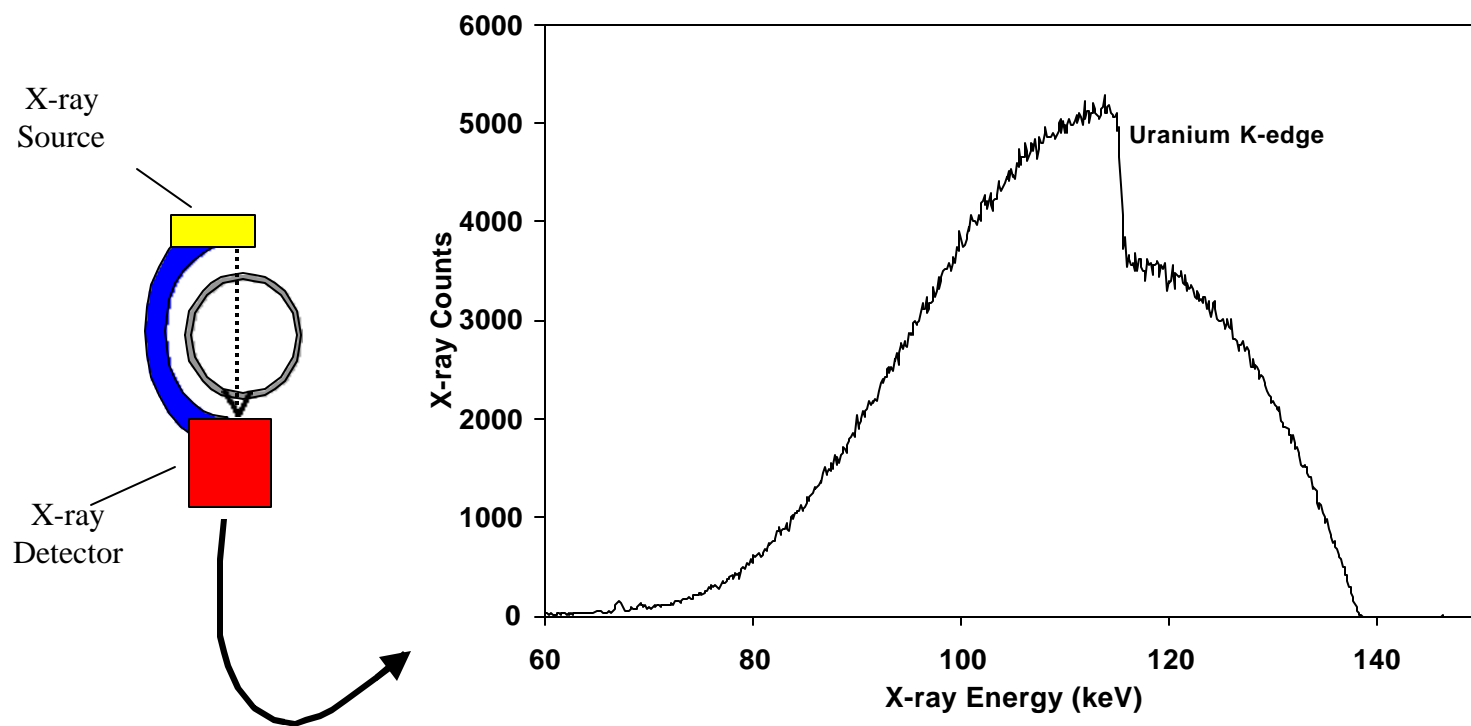
X-Ray, K-Edge



Equipment in Hut to support Tech Demo



X-Ray, K-Edge



K-Edge Drop for a Tech Demo X-Ray Shot



Lathe Enclosures Exhaust Ventilation System



Lathe Enclosures Exhaust Ventilation System



Scaffolding erected around Exhaust Ventilation Systems



X-Ray, K-Edge



Shielding and Equipment in-place to support Tech Demo



X-Ray, K-Edge



Inspection Head on Scaffolding Platform



X-Ray, K-Edge



Inspection head attached to Vertical Stand on Dolly



X-Ray, K-Edge

Significant Results

- X-Ray, K-Edge precision in the range of + or - 3%.
- Wide-angle images of the ventilation duct interior provided an invaluable uranium profile of the interrogated areas.
- Photographic images and narrow beam spectroscopic traces provided a documented record of the characterization data.
- Vertical stand / dolly arrangement made manipulation of the inspection head very easy.



X-Ray, K-Edge

Benefit to the 321-M Deactivation Project

- Provided spatial information on the whereabouts of uranium in the rooftop ventilation ducts.
- More precisely quantified the uranium in the ventilation ducts.
- Facilitated development of a scope of work document and a cost estimate for ventilation duct highly enriched uranium (HEU) removal work.



X-Ray, K-Edge

Benefit to the DOE Complex End Users

- Provides precise assay measurements
- Provides a quantifiable profile of the heavy metal holdup within a container
- Provides a real-time record of each image and narrow beam spectroscopic measurement
- Provides a non-destructive evaluation of containers with different geometries and varying wall thicknesses



X-Ray, K-Edge

Broad End User Need(s) Addressed

- Need for a more precise heavy metal characterization technique (NaI technology is +100%, -50%)
- Need for better spatial resolution of the holdup material that is found



X-Ray, K-Edge

SRS STCG Need(s) Addressed

- SR99-4005 Characterization of Inaccessible Areas



X-Ray, K-Edge

X-Ray, K-Edge vs Competing Technologies

- X-Ray, K-Edge **more precise** than the NaI hand-held detector and other conventional, in-situ, passive gamma measurement systems.
- X-Ray, K-Edge provides **better spatial resolution** than the competing technologies.
- **Mobilization costs** for X-Ray, K-Edge are **greater** than those for competing technologies.
- **Characterization time** per linear foot of ventilation duct/pipe is anticipated to be the **same** for X-Ray, K-Edge and the competing technologies.
- **Setup time** between measurements **could be longer** for X-Ray, K-Edge than that experienced for competing technologies.



X-Ray, K-Edge

Equipment Boom

(Inspection Head attaches to extended arm)

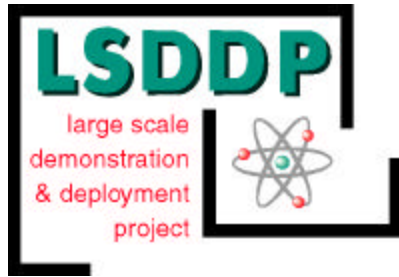




X-Ray, K-Edge

Technical, Cost, and Schedule Status for the X-Ray, K-Edge Technology Demonstration

- Technical: Completed 132 x-ray shots in 26.5 hours on 84 feet of rooftop exhaust ventilation ducting with better precision than the conventional technologies
- Cost: Technology provider cost was \$12K, SRS project cost in direct support of the technology demonstration was \$69.5K
- Schedule: Completed the rooftop technology demonstration on 2/26/99.

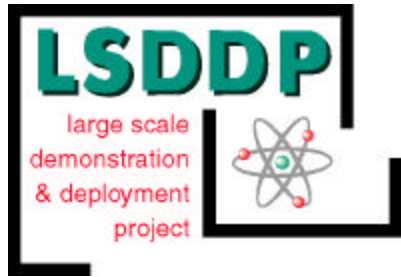


Size Reduction

SIZE REDUCTION

and

DEPLOYMENT SHEAR PLATFORM



Size Reduction

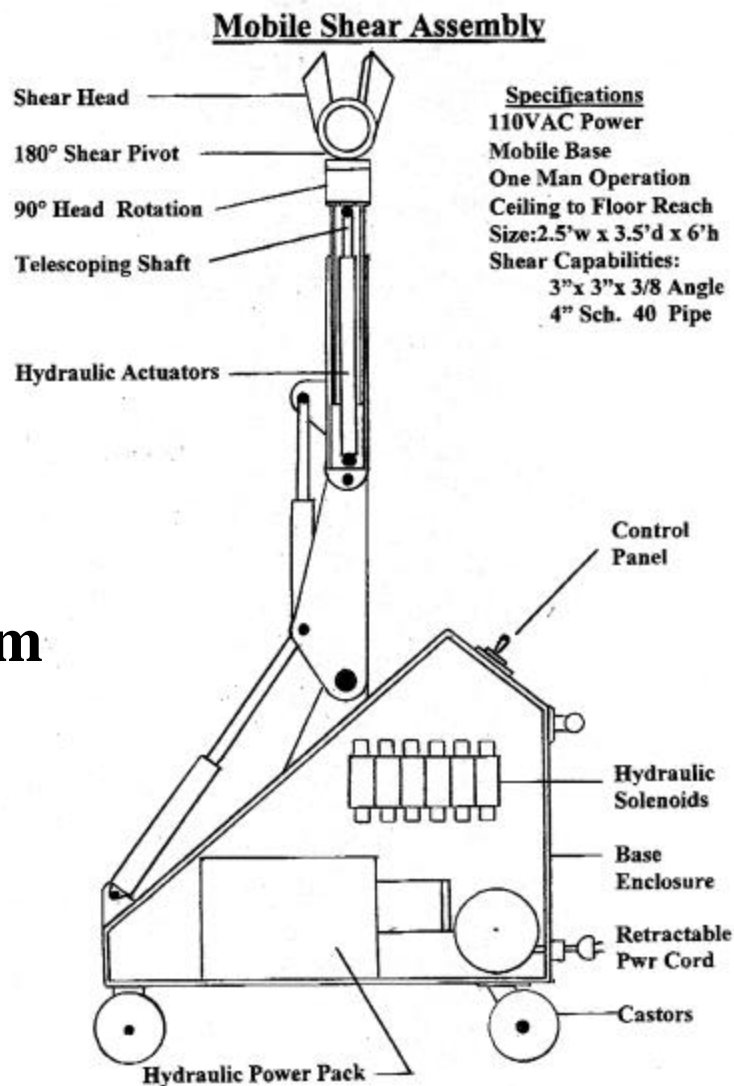
Overview of Technology Demonstration

- Technology Provider - Utility Engineering, (Denver, Colorado)
- Equipment & Operation
- Technology Demonstration Scope:
 - cut loose materials, floor level
 - cut fixed in place materials, floor level to roof
 - cut supports and piping, overhead



Size Reduction

Size Reduction & Deployment Shear Platform





Size Reduction

Significant Results

- Tech Demo scheduled to start 7/99
- Baseline Technology - Porto-Band Saw and Hand-Held Shears
- Tech Demo Goals:
 - prove Shear Platform to be faster than baseline
 - prove Shear Platform results in less operator fatigue than baseline
 - prove Shear Platform to be safer than baseline



Benefit to the 321-M Deactivation Project

- Will reduce the size of items so they are easier to handle
- Will facilitate the removal of loose and fixed materials from the Contamination Area
- Will reduce the size of items so they take up less space in the waste container
- Will result in the generation of less waste containers



Size Reduction

Benefit to the DOE Complex End Users

To be proven by technology demonstration:

- Can cut larger items than strictly hand-held baseline tools
- Can be worked from a ladder versus building a scaffold
- Can reduce operator fatigue while increasing safety margins



Size Reduction

Broad End User Need(s) Addressed

Anticipate Shear Platform will satisfy the following needs:

- Compact tool platform that can operate in restricted quarters
- Can easily work in an overhead environment
- Easy to relocate platform by manual means
- Can fit through standard 36-inch doorways
- Can take the weight of the shear tool off the operator

Criterion 2(p1): Relevancy



Size Reduction

SRS STCG Need(s) Addressed

- No matches

Criterion 2(p2): Relevancy



Size Reduction

Shear Platform vs Competing Technologies

To be proven by technology demonstration:

- Shear Platform can realize increased production rates over competing technologies for waist high cutting and above.
- Shear Platform is more economical than competing technologies for waist high cutting and above.
- Shear Platform cutting will not spread contamination.
- Shear Platform cutting will generate less secondary waste.



Size Reduction

Technical, Cost, and Schedule Status for the Size Reduction Technology Demonstration

- Technical: Awarded contract 4/30/99
- Cost: TBD
- Schedule: Technology demonstration scheduled for 7/99



X-Ray, K-Edge